MN39242FT

Diagonal 4.5 mm (type-1/4) 570k-pixel CCD Area Image Sensor

Overview

The MN39242FT is a 4.5 mm (type-1/4) interline transfer CCD (IT-CCD) solid state image sensor device.

This device uses photodiodes in the optoelectric conversion section and CCDs for signal readout. The electronic shutter function has made an exposure time of 1/10 000 seconds possible. Further, this device has the features of high sensitivity, low noise, broad dynamic range, and low smear.

This device has a total of 566 040 pixels (795 horizontal \times 712 vertical) and provides stable and clear images with a resolution of 480 horizontal TV-lines and 420 vertical TV-lines.

Part Number	Size	System	Color or B/W		
MN39242FT	4.5 mm (type-1/4)	PAL	Color		

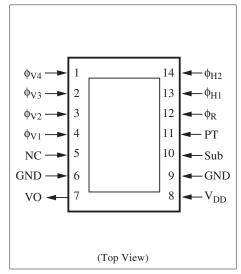
Features

- Effective pixel number: 752 (horizontal) × 697 (vertical)
- High sensitivity
- Broad dynamic range
- Low smear
- Electronic shutter

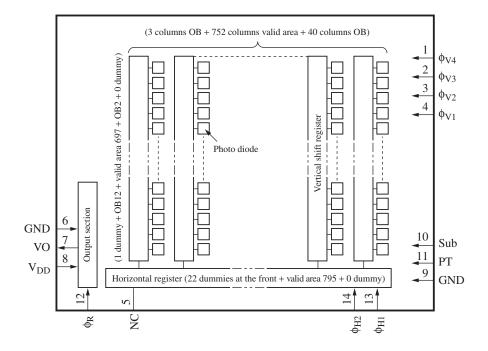
Applications

• Camcorders

Pin Assignments



Block Diagram



Pin Descriptions

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	ϕ_{V4}	Vertical shift register clock pulse 4	8	V _{DD}	Power supply
2	φ _{V3}	Vertical shift register clock pulse 3	9	GND	GND
3	φ _{V2}	Vertical shift register clock pulse 2	10	Sub	Substrate
4	φ _{V1}	Vertical shift register clock pulse 1	11	РТ	P-well for protection circuit
5	NC	NC	12	φ _R	Reset pulse
6	GND	GND	13	$\phi_{\rm H1}$	Horizontal register clock pulse 1
7	VO	Video output	14	ф _{Н2}	Horizontal register clock pulse 2

■ Device Parameter (H × V)

Parameter	Value	Unit
Total pixel number	795 × 712	pixel
Active pixel number	737 × 690	pixel
Pixel dimension	4.85×3.9	μm^2
Image sensing block dimension	3.65×2.72	mm ²

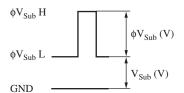
_		Absolute max	kimum rating	Op					
Para	imeter	Lower limit	Upper limit	Min	Тур	Max	Unit		
V _{DD}		- 0.2	18.0	14.5	15.0	15.5	V		
V _{PT} *3, 4		-10.0	0.2	-7.5	-7.0	-6.5	V		
GND		(Reference voltage)			0		V		
$V_{\phi R}$	High-Low		8.0	3.0	3.3	3.6	V		
	Bias		(S	upplied internal	ly)		V		
$V_{\varphi H1}$	High		8.0	3.0	3.3	3.6	V		
	Low	- 0.2		- 0.05	0	0.05	V		
$V_{\phi H2}$	High		8.0	3.0	3.3	3.6	V		
	Low	- 0.2		- 0.05	0	0.05	V		
V _{Sub} *2		(Supplied internally)							
$\phi V_{Sub}{}^{*1}$		- 0.2	45.0	21.2	22.0	22.8	V		
$V_{\phi V1} * 3, 4$	High		18.0	14.5	15.0	15.5	V		
	Middle			- 0.05	0	0.05	V		
	Low	-9.0		-7.3	-7.0	-6.7	V		
$V_{\phi V2} *^{3, 4}$	Middle		15.0	- 0.05	0	0.05	V		
	Low	-9.0	_	-7.3	-7.0	-6.7	V		
$V_{\phi V3} *^{3, 4}$	High		18.0	14.5	15.0	15.5	V		
	Middle	_		- 0.05	0	0.05	V		
	Low	-9		-7.3	-7.0	-6.7	V		
$V_{\varphi V4}$ *3, 4	Middle		15.0	- 0.05	0	0.05	V		
	Low	-9.0		-7.3	-7.0	-6.7	V		
Operating te	mperature	-10	70		25		°C		
Storage temp	perature	-30	80	_		_	°C		

Absolute Maximum Ratings and Operating Conditions

Note) 1. Standard photo detecting condition

Standard photo detecting condition stands for detecting image with a light source of color temperature of 2856K, luminance of 1050 cd/m², and using a color temperature conversion filter LB-40 (HOYA), infrared cut filter CAW-500S with thickness 2.5 mm for a light path and with F8 lens aperture. The quantity of the incidental light to a photo-detecting surface under the above condition is defined as the standard quantity of light.

2. *1: V_{Sub} when using electronic shutter function



- *2: V_{Sub} supplied internally is the voltage suppressing the blooming generation at ×1 000 light quantity relative to the standard light quantity.
- *3: Relation between V_{PT} and $V_{\phi VL}$

Set V_{PT} under the following condition against VL of a vertical transfer clock waveform.

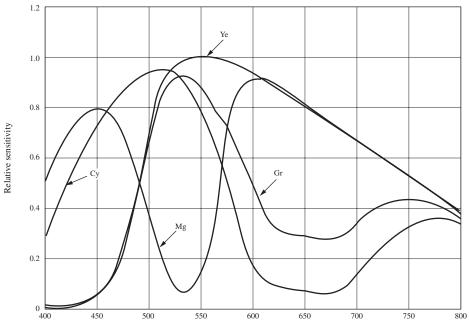
$$V_{PT} \le VL (V_{\phi V1L} \text{ to } V_{\phi V4L})$$

*4: Absolute maximum ratings
$$-0.2 < V_{\phi V} - V_{PT} < 24.5$$
 (V)

Optical Characteristics

Parameter	Symbol	Conditions	Min	Тур	Max	Unit
S/N ratio (dark)	S/Nd	Dark condition	59	61	—	dB
Sensitivity	So	J chart F8	160	190	—	mV
Carrier saturation output	Sa	Carrier maximum output	400	500		mV
Vertical smear	Sm	1/10 V chart, F2.8		0.008	0.01	%

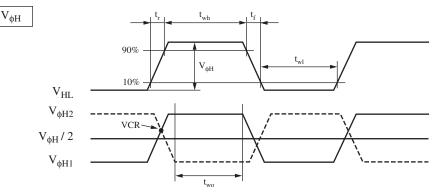
Graph of Characteristics



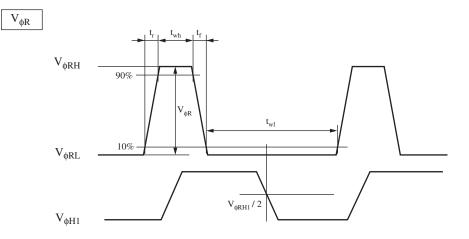
CCD color filter spectral characteristics

Wavelength (nm)

CCD Drive Timing Charts



The overlap period of t_{wh} of horizontal transfer pulse $V_{\varphi H1}$ and t_{wl} of $V_{\varphi H2}$ and the overlap period of t_{wl} of horizontal transfer pulse $V_{\varphi H1}$ and t_{wh} of $V_{\varphi H2}$ are defined as t_{wo} . And VCR is the cross point voltage of the rising $V_{\varphi H1}$ and the falling $V_{\varphi H2}$.



 $V_{\phi RL}$ is the mean value of the waveform from the cross point of the mesial magnitude of above ϕ_{H1} and ϕ_{Rtwl} period to the rising point.

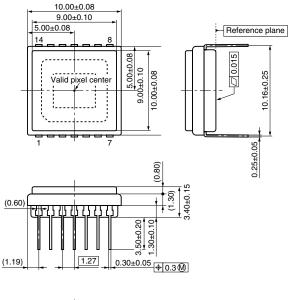
And $V_{\phi RH}$ is the minimum value in t_{wh} period, and $V_{\phi R}$ is defined as $V_{\phi R} = V_{\phi RH} - V_{\phi RL}$.

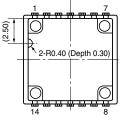
Paramatar	Symbol	t _{wh}		t _{wl}		tr		t _f		Unit				
Parameter	Symbol	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
Reset pulse	$V_{\phi R}$	9.0	10.0		46.5	47.5			3.0	4.0		3.0	4.0	ns
Horizontal	$V_{\phi H1}$	23.75	25.75		23.75	25.75			6.0	8.0		6.0	8.0	ns
transfer pulse	V _{\$\phiH2}	23.75	25.75		23.75	25.75			6.0	8.0		6.0	8.0	ns

Parameter	Symbol		Unit		
Falameter	Symbol	Min	Тур	Max	Unit
Horizontal transfer pulse	$V_{\phi H1}$, $V_{\phi H2}$	20.75	25.75		ns

VCR is $V_{\varphi H}/$ 2 volts or more.

- Package Dimensions (unit: mm)
- WDIP014P-0400F





- 1. The center of the package is equal to the center of the effective pixel area.
- 2. The rotation angle of the effective pixel area: up to ± 1.0 degree
- 3. The distance from the bottom face of the package to the surface of the effective pixel area: 1.69 mm \pm 0.10 mm
- 4. The tilt of the effective pixel area for the bottom face of the package: up to 25 μm
- 5. Thickness of seal glass is 0.8 mm, and the refractive index is 1.50.
 - 6. Package weight: 0.65 g (typ.)

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